An Examination of Perseveration in Personality Inventory Responses

An abstract of a thesis by
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The Problem: This study was designed to test the hypothesis that perseveration in personality inventories can be measured and used diagnostically. Perseveration is defined as the inability to shift or to break through an established set in order to perform a task. Possibilities of improving the method of measurement of perseveration were explored.

Procedure: Subjects used were nursing students and selected psychiatric patients. Subjects were divided into high-performing normals, low-performing normals, schizophrenics, and organics. The Psychological Screening Inventory (PSI) was administered to all subjects. Inventories were scored on two measures of perseveration and the four groups were compared. The groups were also compared with a normative group on selected sections of the inventory.

Findings: Results showed a weak but significant difference between organics and the other three groups on both perseveration measures. The other three groups did not differ on these measures, but, on the selected test sections, differences were found between observed frequencies of perseveration scores and expected frequencies derived from the normative data.

Conclusions: It was concluded that perseveration does occur in personality inventories and that it can be used diagnostically. Furthermore, the results indicate that discriminative ability could be improved by reordering test items using normative data.

Recommendations: Further study of the perseveration phenomenon using tests with special item ordering could clarify the results of this study.

AN EXAMINATION OF PERSEVERATION IN PERSONALITY INVENTORY RESPONSES

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by

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CHAPTER I

INTRODUCTION

Personality questionnaires or inventories have been in use since World War I. Initially they were conceived as devices to inquire into the problems, behavior, symptoms, and attitudes of the subject in a manner similar to that of the psychiatric interview but, because they are self-administering, they conserved a great deal of the valuable time of skilled interviewers. There were also thought to be other advantages, such as standardization of presentation and objectivity in interpretation.

Over the years many inventories have been designed and used to study personality. They have been applied to clinical and selection purposes and used for research. Much attention has been given to the improvement of these tests; special scales have been developed on many tests to indicate bias or faking and elaborate techniques have been designed for construction and validation of inventories. In spite of all these efforts, the best available inventories still show a very limited degree of validity, particularly in selection situations, where the full cooperation of applicants cannot be taken for granted, and where the populations may be fairly homogeneous in terms of the variables to be tested.

Almost all inventories in use today are constructed

on the assumption that the content of the items (in interaction with the subject's characteristics) is the principal factor determining the subject's responses. One idea which departs from this basic assumption is that Ss may approach an inventory with certain biases or tendencies which affect their overall pattern of answers. Some awareness has developed of what are termed "response sets" or "response styles" such as social desirability and acquiescence. Recognition of the existence of response styles led to hypotheses that the response styles were important measures of personality and that they might be used to increase validity of inventories. Although it appears that response styles do exist (Nunnally, 1967), the numerous attempts made to prove them to be important measures of personality have met, generally, with failure (Rorer, 1965).

We are left with the question of whether there might be some sort of response style or other phenomenon which has not been studied but which is actually operating and which may be quantifiable and useful in improving the validity of existing inventories. This thesis is an attempt to study one such phenomenon - that of perseveration in personality inventory responses - and to cross-validate results earlier obtained by Frankle (1971) demonstrating the existence of perseveration and its apparent relation to some important behavior patterns.

The general concept of perseveration had its origin in clinical observations and was first systematically studied in the early 1900's. In the earlier literature, writers tend to define perseveration in terms of neural activity, but more recent authors emphasize behavior. Kleemeier and Dudek (1950), dealing with flexibility, define it as "the ability (a) to shift from one task to another or (b) to break through an established set in order to perform a task." Perseveration may be viewed as an opposing tendency: the inability or unwillingness to shift or to break through an established set. Most of the research done on perseveration involved devising tests of perseveration in an attempt to identify different factors or types of perseveration. An example of these perseveration tests would be the S-2 tests (Eysenck, 1961). The subject would first be asked to write S as quickly as possible for one min. and then write 2 as quickly as possible for one min. After that he would be asked to write S2S2 for two min. Different scoring methods were used, each in an attempt to measure interference with a new response. Cattell (1935) was responsible for much of the work done in developing these tests and for distinguishing different types of perseveration.

Many researchers went on to study perseveration in relation to personality variables. Studies were done indicating that high perseveration scores were characteristic

of depressives, schizophrenics, neurotics and stutterers, while low perseveration scores were found in manics and neurotics; but there were many conflicting results. Rim (1955) states,

> "Sensory, motor and ideational tests have been employed; factors of perseveration have been identified with varying success; relationships between perseveration and introversion-extraversion and/or neuroticism have been both found and denied by different authors. But the evidence did not seem convincing because of inherent weaknesses in most of the studies (p. 325)."

Rim's (1955) careful study resulted in the isolation of three factors of perseveration, none of which was significantly related to neuroticism, to differences among neurotic types, or to introversion-extraversion. In his discussion of the perseveration studies, Eysenck (1961) concludes that "factors of perseveration are of little importance in defining differences either between neurotics and normals or between extraverts and introverts (p. 48)."

A new approach to the study of perseveration phenomena, making use of personality inventories, was devised by Frankle (1971). He conceived of personality inventory items as a multiplicity of miniature social situations or miscellaneous stimuli to which S is asked to make a series of responses. The number of response options usually ranges from two to five, and most inventories are designed in such a way that S's responses will shift fairly often from option to option. Frankle suggested that

Ss who frequently alternated their responses between true-and-false or multiple-choice options were adjusting their responses to each individual item, whereas those who gave long runs of the identical response were responding in a perseverative and less discriminating manner. He held that Ss' test-taking behavior might be directly related to their behavior in other life situations, and that Ss with tests showing a high degree of perseveration might be less discriminating in their responses to their changing environment.

It should be noted that Frankle's study of perseveration phenomena utilizes concepts of personality and personality measurement which are somewhat different from the traditional ones. His view of perseveration is more in line with what Wallace (1966) calls "an abilities conception of personality (p. 132)," and differs from the traditional need and trait approaches to personality study. Frankle's method attempts to measure the ability of S to adapt his responses to each item of the inventory, representing departure from the traditional method which relies on self report. He attempts to measure an aspect of S's behavior when answering a personality inventory rather than just S's responses to item content. Advantages of a behavioral approach to personality assessment as opposed to the traditional approach are well-documented (Goldfried & Kent, 1972).

Subjects used in Frankle's (1971) perseveration studies were social work graduate students, student nurses, and Teacher Corps interns. All Ss were involved in training programs which included practical experience in addition to academic work. Because Frankle wanted a measure of practical performance rather than academic performance, grade point averages for the practical parts of the training programs were used as the criteria.

In Frankle's (1951) first attempt to measure perseveration, he counted the number of times S gave the same answer to successive pairs of items on a five-response option inventory, the Minnesota T-S-E (thinking, social, and emotional). Subjects were two groups of social work graduate students, tested near the time of their admission to the two-year program. The criterion was field work grade point average at the end of the program. The biserial r for the perseveration scores and fieldwork GPA was -.63 for one group and -.44 for the other, both being predictive validity indexes. None of the usual T-S-E scores or scholastic aptitude scores showed a significant correlation with field work GPA.

In more recent work, Frankle (1971) used a different index to obtain scores on personality inventories of the true-false variety. Two groups, one of social work graduate students and one of Teacher Corps interns were used. The independent variable was the sum of sequential

response shifts through the 480 items of Gough's California Psychological Inventory (CPI). Another test, Lanyon's Psychological Screening Inventory (PSI) was also used with the Teacher Corps group. In all cases significant correlations were found between sequential shift rate and field work performance ratings made during the same year as the testing. Results on the CPI indicated an optimum range of shifts, with both very high and very low scores correlating with poorer performance. Biserial r was used with all groups because the regression was not linear. Subjects were divided into high-performing and low-performing groups. Split-half measures showed the reliability of the shift count to be quite low, approximately .55-.60 for the CPI and only .19 for the PSI. Because shift count and perseveration scores are attempting to measure a response trend throughout the test and cannot be scored item by item, it seems likely that split-half measures would not adequately test the reliability of such scores.

Further study was done by Frankle (1971) using three separate samples of student nurses from two hospitals. Staff judgment of students' clinical performance, rather than academic work, was the criterion used. The CPI and PSI were again used and scored for shift counts. The CPI results all went in the predicted direction although the point of statistical significance was reached in only

one of the three groups. Significant results were obtained for all three samples, using shift counts on the PSI, while a perseveration score (sum of runs of four or more identical responses) seemed to show larger group differences.

For his last sample, Frankle tested 32 paraprofessional trainees in the New Careers program at Drake University, using the CPI. Shift scores did not significantly differentiate highs from lows, although they tended to go in the right direction. It was found, however, that the mean number of shifts for the New Careers group was approximately equal to that of the nursing students and social work graduate students. This finding is noteworthy since the New Careers trainees, in most cases, had not completed high school and came from economically deprived areas. This suggests that shift scores are not influenced significantly by educational or socioeconomic levels.

Of the measures employed in these studies, the sum of runs of four or more identical responses on the PSI yielded the most consistently significant results. The design of Lanyon's PSI seems well suited to the study of perseveration. The inventory consists of 130 true-false items which will typically elicit approximately equal numbers of true and false responses from subjects, whether the subjects are classified as normal, neurotic, psychotic, or sociopathic. The items are arranged in such a way that there are not large numbers of successive items which

typically result in the same response for any particular group of Ss (Lanyon, 1970). The design of Lanyon's inventory lends credence to the hypothesis that runs of identical responses are actually perseverative.

Responses of organic patients might also support the perseveration hypothesis. Because it is generally recognized by clinicians that subjects with cerebral injury or lesions more often show perseveration in their behavior than do normals or neurotics, it seems plausible that a group of patients diagnosed as having some degree of cerebral injury would tend to show more perseveration on the ISI than would well-adjusted normals. Organic patients might also be expected to show more perseveration than a separate group of psychiatric patients. PSIs have been obtained for a group of patients showing evidence of very slight, mild, or moderate degree of cerebral disorder, and the amount of perseveration they manifested on this test will be contrasted with that shown by normals and by psychiatric patients assumed to be free from cerebral disorder.

It is not proposed that item content is of little importance in personality inventories, but rather that an additional variable, that of the tendency to perseverate, is superimposed upon the basic tendency to respond to the content of items. This hypothesis was suggested by an examination of the ISIs of organic patients compared

to those of the high performing normals in Frankle's (1971) studies. At certain points in the inventory, many of the normals responded with three successive trues or falses while some of the organics gave runs of four or five responses of the same type, suggesting that the normals perceive some cue to change their response while the organics, once having started a run, have more trouble stopping. While it seems likely that perseveration would be most clearly manifested in runs of some length, it also seems possible that even runs of two or three identical responses could be perseverative. Difficulty in making shifts after even one item may represent perseveration on a less conspicuous scale. Disinclination to shift away from a previous pattern of responding even when confronted with a stimulus calling for it is the essence of perseveration, one form of inadaptivity.

Although Frankle's (1971) perseveration scores did discriminate significantly between high-performing and low-performing Ss on the PSI, it seemed possible that even better results could be obtained with a personality inventory specifically designed to differentiate on the basis of perseveration. Reordering the items of the PSI might improve discrimination, but it is not clear just how this reordering should be done. Would discrimination be improved if large numbers of items which typically result in the same response were placed in sequence? A different

approach would be to alternate items with high and low probabilities of a true response.

This study was designed to explore the differential tendency of schizophrenic, organic, and high- and low-performing nursing groups to perseverate on the items of the PDI and to explore the possibility that selected arrangements of those items could enhance that tendency.

CHAPTER II

METHOD

Subjects

Original Ss were 78 female seniors and 80 female juniors in the nurse's training program at Iowa Methodist Hospital. Out of the original 158 Ss, 52 were later classified as high-performing Ss and 51 as low-performing. The other 55 Ss had ambiguous classifications and were not used in the rest of the study.

Sixty female psychiatric patients were also used, 36 of them classified as schizophrenics and 24 classified as having mild to moderate cerebral disorder. These Ss were patients at Broadlawns Polk County Hospital and were diagnosed by the psychiatric staff there. Some were in-patients and some out-patients.

Only female Ss were used in order to control for the variable of sex.

Testing Procedures

Nursing students were tested at Methodist Hospital and were informed that the purpose of the testing was to establish better selection techniques for applicants for nurse's training. The ISI was administered (see Appendix A) and a sociometric measure was taken. The sociometric asked for names of three people in the S's class (junior or senior) who were especially competent in their nursing

performance (see Appendix B).

The PSI was administered to the psychiatric patients as part of a routine testing procedure at or near the time of admission to Broadlawns Hospital.

Performance classification

Sociometrics for the nursing students were scored separately for the junior and senior classes. Each student received 2 points for a first choice by another student, $1\frac{1}{2}$ points for a second choice, and 1 point for a third choice. Points were totaled, and students were placed in the upper or lower half of their class according to points received. In addition, grade point averages for clinical course work were obtained, and each class was divided into upper and lower halves according to clinical GPA. Academic grades were not used. Finally, those students who fell in the upper half of their class on both measures were classified as high-performing Ss, while those who fell in the lower half of their class on both measures were classified as low-performing Ss. The correlation coefficient for the two performance measures was .469.

Procedure for examining effects of item order

Four 7-item sections of the FDI were selected for examination of the effects of different types of item ordering. A table was used consisting of item response frequencies for 400 females in Janyon's normative sample.

The proportion of Lanyon's Ss responding true to a particular item was used to select three sections of the test which appeared to have different stimulus properties. The first run of seven items selected was called the oscillatory section because the proportion of true responses for each item alternates between high (above .500) and low (below .500). Proportions of true responses for the seven consecutive items of this run are .887, .355, .527, .360, .692, .280, and .912. The second section, the T section, consists of seven consecutive items, each having a high proportion of true responses. Proportions of true responses for the items of this section are .760, .574, .662, .900, .907, .587, and .607. The third section, or F section, consists of seven consecutive items with low proportions of true responses. Proportions are .242, .345, .597, .347, .047, .200, and .045. One of the proportions exceeds .500 slightly. A fourth section consisting of seven randomly-selected items was used to control for the effects of adjacency. Proportions of true responses for this section are .432, .577, .802, .447, .280, .690, and .445 (see Appendix C).

The proportions for Lanyon's sample were used as probabilities in order to generate an expected frequency distribution for all possible numbers of response shifts throughout each of the 7-item sections (see Appendix C).

Irobabilities were computed for all possible ways of responding to the seven items of each section by multiplying the seven different probabilities of a true or false response to each item in the run. For example, the probability of responding T T T T T T F to the seven consecutive items of the oscillatory run is .00101862, the product of .887, .355, .527, .360, .692, .280, and .088. The probabilities were summed for all ways of responding to a section with 0 shifts and then with 1, 2, 3, 4, 5, and 6 shifts. This resulted in an expected distribution of shift scores. In this way, actual numbers of shifts for each of the four groups could be compared to an expected distribution of shift scores for each of the four 7-item sections.

Data generated

The PSIs for all Ss were scored for both total shift scores and perseveration scores (see Appendix F). Total shift scores are determined by counting the number of times S changes his responses from true to false or from false to true. If S responded T F T T T F F T F F to the first ten items of the test, he would have shifted five times. For the 130-item PSI a total shift score of 129 would be the highest possible score, and 0 would be the lowest. Perseveration scores are determined by counting the total number of responses which are included in runs of four or more successive identical responses.

If S responded with four successive true responses at one point in the inventory and five successive false responses at another point, his perseveration score would be 9. Perseveration scores could range from 0 to 130. The distributions of these two measures will be compared.

Shift scores for the four 7-item sections of the ISI (oscillatory section, T section, F section, and control section) were determined for all Ss. These ranged from 0 to 6 (see Appendix F).

CHAPTER III

RESULTS

A significant difference ($F = 4.5239$, $df = 3/159$, $p < .005$) between groups on total shift scores was obtained. Comparisons among sample means indicate that the difference lies between the organic group and all of the other groups. Differences among the high-performing, low-performing, and schizophrenic groups were not significant (see Appendix D). The mean was 65.21 for the high-performing group, 63.94 for the low-performing group, 64.55 for the schizophrenics, and 59.87 for the organics. With the exception of the schizophrenic group, the means went in the expected direction, but the difference between the high- and low-performing nursing groups did not approach the level of significance. The estimated proportion of variation (omega squared) accounted for by group differences was .061.

Results on the perseveration scores were similar ($F = 4.7947$, $df = 3/159$, $p < .005$). Comparisons among sample means indicate that the organic group scored significantly higher on perseveration than the other three groups and that the other three groups do not differ from each other significantly (see Appendix D). The mean was 40.72 for the high-performing group, 41.65 for the low-performing group, 39.47 for the schizophrenic

group and 50.00 for the organic group. Again, with the exception of the schizophrenic group, the means went in the expected direction, but only the organic group differed significantly from the other groups. The estimated proportion of variation (omega squared) accounted for by group differences was .065.

In comparing the distribution of total shift scores with the distribution of perseveration scores, the distribution of shift scores was more nearly normal. Table 1 shows the results of the computation of the mean, variance and indexes of skewness and kurtosis for the two distributions.

Shift scores for the four 7-item sections of the HSI were tabulated for the four groups. The chi-square goodness-of-fit test was used with each group to compare observed frequencies of shift scores with expected frequencies of shift scores for each section. The tables for the individual computations may be found in Appendix E. Table 2 shows the results of those computations.

The oscillatory section differentiates best between pathological and normal groups. Neither high-performing nor low-performing groups differed significantly from the expected frequency distribution of shift scores, while both the schizophrenic and organic groups differed significantly in the direction of fewer shifts than expected.

On the T section the high-performing group differed

TABLE 1

Mean, Variance, and Indexes of Skewness and Kurtosis for Distributions of Total Shift Scores and Perseveration Scores

Indexes	Distributions	
	Total Shift Scores	Perseveration Scores
Mean	63.88	41.90
Variance	38.41	154.87
Skewness	- 0.04	+ 0.12
Kurtosis	+ 0.02	- 0.25

TABLE 2

Summary of Chi-square (x^2) Tests for Shift Scores for Four 7-item Sections of the PSI: Comparisons with Expected Frequencies Generated from Lanyon's Sample

Group	Sections			
	Oscillatory	T	F	Control
High	$x^2 = 5.174$ df = 4	$x^2 = 13.010^{**}$ df = 4	$x^2 = 16.671^{**}$ df = 4	$x^2 = 4.366$ df = 4
Low	$x^2 = 7.052$ df = 4	$x^2 = 3.999$ df = 4	$x^2 = 8.548$ df = 4	$x^2 = 0.446$ df = 4
Sex.	$x^2 = 16.556^{***}$ df = 1	$x^2 = 27.215^{***}$ df = 4	$x^2 = 9.688^{*}$ df = 4	$x^2 = 3.307$ df = 2
Rel.	$x^2 = 13.955^{***}$ df = 1	$x^2 = 6.558$ df = 3	$x^2 = 0.030$ df = 2	$x^2 = 0.756$ df = 2

Note: $^{*}p < .05$
$^{**}p < .01$
$^{***}p < .001$

from the expected frequency, but the direction is not clear. In the high-performing group more Ss received both high and low scores and fewer Ss received scores in the middle of the range than in the expected distribution. Neither the low-performing group nor the organic group differed significantly from the expected frequency distribution, while the schizophrenic group had a greater number of shifts than expected.

On the F section only the high-performing group differed significantly from the expected distribution, in the direction of fewer shifts.

None of the four groups differed significantly from the expected distribution on the control section.

CHAPTER IV

DISCUSSION

The fact that both total shift scores and perseveration scores did differentiate significantly between organics and the three other groups supports the hypothesis that perseveration does occur in personality inventories and that it can be measured.

The total shift scores and perseveration scores for the high-performing and low-performing groups did go in the expected direction, with highs scoring higher on total shifts and lower on perseveration, but the scores did not differentiate significantly between the two groups as they had in the earlier studies cited. The mean perseveration score for the high-performing Ss (40.77) was somewhat higher than the mean score for some of Frankle's high-performing groups (1971). There were a few complaints from Ss about giving their time to this testing project, and it is possible that their complete cooperation was not secured. If this were the case, Ss might not have responded as carefully to each item as they would have under different circumstances. Another possible explanation for the lack of significant differentiation would be that the groups were pre-selected at the time of testing. Subjects were tested at the beginning of their junior or senior year of a three-year nurse's

training program. Selection prior to admission and attrition during the first or second year of training had already taken place. If Ss had been tested as part of the original selection process, better differentiation might have been achieved. A study of the follow-forward type could answer this question.

The total shift scores and perseveration scores for the schizophrenics are more difficult to interpret. As predicted, total shift scores were higher and perseveration scores lower than they were for the organic group, but the mean shift score for the schizophrenics fell between the mean scores for the highs and lows, and the mean perseveration score for the schizophrenics fell below the mean scores for both the normal groups. A possible explanation for this can be found by looking at the results of the comparisons of shift scores for the different sections of the PSI. While the schizophrenics shifted less often than expected on the oscillatory section, they shifted more often than expected on the T section. This suggests that while total shift scores and perseveration scores may not be useful in discrimination between normals and schizophrenics, there are areas of the test which do discriminate between these groups. Further analysis of the different iter sequences of the test could result in useful differentiation.

The results of the second part of this study

indicate that reordering the items of the PSI might increase differentiating power, at least between normals and psychiatric patients. While no significant differences were found between groups on the control section, the patient groups shifted less often than the normal groups on the oscillatory section. This suggests that constructing a test with that kind of alternation might produce more useful results than does the PSI in its randomized order. It is possible that the results on the oscillatory section are due less to item ordering than to item content; proportions of true responses for Lanyon's general population sample may not be applicable to the patient groups (see Appendix F). It does appear, however, that on the oscillatory section, schizophrenics differ from Lanyon's sample little more than do the high-performing Cs on the proportions of true responses to each item. Organics differ from Lanyon's sample slightly more than do the schizophrenics on this section. Differences between Lanyon's sample and the patient samples were somewhat greater on the control section. The fact that results for the oscillatory section were highly significant while results for the control section were not significant does argue for the effect of item order. Construction and use of a test of the alternating true-false type appears to be a useful endeavor.

The results of this study indicate that the idea

of perseveration is not only of theoretical interest but is promising in terms of practical application. Further work with the analysis of item sequences and with item arrangement could, quite possibly, produce tests and methods of scoring with considerable utility.

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APPENDIX A

PSYCHOLOGICAL SCREENING INVENTORY

Research edition

If a statement tends to be true for you, blacken the circle in the column headed T: that is, T ● F ○
If a statement tends to be false for you, blacken the circle in the column headed F: that is, T ○ F ●

T	F		
○	○	1.	I enjoy classical music.
○	○	2.	I am usually happy.
○	○	3.	Being a TV announcer would be fun.
○	○	4.	I am happy just being alone.
○	○	5.	Shooting is a good sport.
○	○	6.	At times I lose all my drive.
○	○	7.	I guess I am not very efficient.
○	○	8.	I have never broken a major law.
○	○	9.	I do not worry about going insane.
○	○	10.	Things are always frightening me.
○	○	11.	Sometimes I don't quite know what to say.
○	○	12.	I forget things more quickly nowadays.
○	○	13.	People usually understand me.
○	○	14.	I think carefully about all my actions.
○	○	15.	I think there is something wrong with my memory.
○	○	16.	I am active in clubs.
○	○	17.	I don't get sick very often.
○	○	18.	It is fun to bet.
○	○	19.	I am rarely at a loss for words.
○	○	20.	When I sleep I toss and turn.
○	○	21.	I guess I know some pretty undesirable types.
○	○	22.	I do not like to gamble.
○	○	23.	I often find it hard to concentrate.
○	○	24.	I have sometimes drunk too much.
○	○	25.	I am sensitive to the needs of others.
○	○	26.	I would like to be more outgoing.
○	○	27.	I break more laws than many people.
○	○	28.	My friends were always welcome at home.
○	○	29.	Adults should not shout and yell so much.
○	○	30.	As a child I occasionally stole things.
○	○	31.	All people tell "white lies."
○	○	32.	I am pretty healthy for my age.
○	○	33.	My thoughts are sometimes unusual.
○	○	34.	I enjoy the theater.
○	○	35.	I take all my responsibilities seriously.
○	○	36.	High speeds thrill me.
○	○	37.	I am tempted to sleep too much.
○	○	38.	I do not curse.
○	○	39.	Most people are honest with themselves.
○	○	40.	I do not like to perform for others.
○	○	41.	My health is no problem for me.
○	○	42.	Sometimes I am no good for anything at all.
○	○	43.	Strange voices have spoken to me.
○	○	44.	I would not like to be an actor.
○	○	45.	I have sometimes sat about when I should have been working.
○	○	46.	I'm afraid I broke a few rules at school.
○	○	47.	Warm relationships are difficult for me.
○	○	48.	At times I am a little shy.
○	○	49.	I frequently feel nauseated.
○	○	50.	My childhood home was happy.
○	○	51.	I have sometimes been tempted to hit people.
○	○	52.	I was always well behaved in school.
○	○	53.	I sometimes get all steamed up.
○	○	54.	My appetite is very healthy.
○	○	55.	I am extremely persistent.
○	○	56.	I am often tired during the day.

(Turn over and continue)

T	F		
O	O	57.	My school teachers had some problems with me.
O	O	58.	Odd things have happened to me in my lifetime.
O	O	59.	I do not like to sit and daydream.
O	O	60.	Few people win arguments with me.
O	O	61.	I am easily distracted from a task.
O	O	62.	I rarely wake up tired.
O	O	63.	People should look after themselves first.
O	O	64.	Sometimes I am tempted to break something.
O	O	65.	I have been tempted to leave home.
O	O	66.	I have no trouble controlling my urges.
O	O	67.	I am rather a loud-mouth at times.
O	O	68.	Most people are looking for sympathy.
O	O	69.	I am a fairly conservative person.
O	O	70.	Much of my life is uninteresting.
O	O	71.	Some people really wish me harm.
O	O	72.	My parents like (or liked) my friends.
O	O	73.	I have little confidence in myself.
O	O	74.	I seldom feel frightened.
O	O	75.	People think I am pretty calm.
O	O	76.	Drug addiction is very undesirable.
O	O	77.	I feel isolated from other people.
O	O	78.	It is very hard to embarrass me.
O	O	79.	I have a lot of energy.
O	O	80.	I never act without thinking.
O	O	81.	The world has always seemed pretty real.
O	O	82.	I have avoided people I did not wish to speak to.
O	O	83.	People tend to watch me.
O	O	84.	The world is full of odd things.
O	O	85.	I like to obey the law.
O	O	86.	I have never had a strange mental attack.
O	O	87.	I always do my work thoroughly.
O	O	88.	People generally like to help others.
O	O	89.	I would make a good leader.
O	O	90.	I sometimes feel I am in a world alone.
O	O	91.	My troubles are not all my fault.
O	O	92.	I enjoy talking in front of groups.
O	O	93.	I find it hard to start a conversation.

T	F		
O	O	94.	I don't like to rush about.
O	O	95.	When I get nervous my hands tremble.
O	O	96.	People stop talking when I approach.
O	O	97.	Being a racing driver would be fun.
O	O	98.	Life treats me badly.
O	O	99.	I have rarely been punished.
O	O	100.	My failures are largely due to myself.
O	O	101.	I would like to be really important.
O	O	102.	I stay away from trouble.
O	O	103.	Sometimes I hear noises inside my head.
O	O	104.	I rarely stumble or trip when I walk.
O	O	105.	Many people do not know how sensitive I am.
O	O	106.	If I don't like somebody, I say so.
O	O	107.	My life is definitely worthwhile.
O	O	108.	I think carefully about most things I do.
O	O	109.	I rarely feel anxious in my stomach.
O	O	110.	People think I am more immature than I am.
O	O	111.	At times I feel worn out for no special reason.
O	O	112.	We should obey every law.
O	O	113.	Some of my relatives have done strange things.
O	O	114.	I am painstaking and thorough.
O	O	115.	I rarely or never get headaches.
O	O	116.	My parents are (or were) too conservative.
O	O	117.	I am usually the one to open a conversation.
O	O	118.	People often embarrass me.
O	O	119.	It is very easy for me to make friends.
O	O	120.	Sometimes the police use unfair tricks.
O	O	121.	Occasionally I feel dizzy or light-headed.
O	O	122.	At school I was never easy to manage.
O	O	123.	I am extremely talkative.
O	O	124.	Some people simply have too much energy.
O	O	125.	I feel that people keep secrets from me.
O	O	126.	I like to let others start a conversation.
O	O	127.	I can usually judge what effect I will have on others.
O	O	128.	My strength often seems to drain away from me.
O	O	129.	Sometimes I wish I could control myself better.
O	O	130.	I have a soft voice.

APPENDIX B

APPENDIX B

Sociometric Measure

NURSING RESEARCH STUDY

Data you provide for this project will be held in strict confidence. Please express your preference on the following:

Your Professional Co-Worker Choice

Imagine that you have completed your professional training and find yourself in charge of a hospital ward. There is a staff vacancy for one other R. N. You are to make the choice, and may select any member of your present class. The job is one requiring unusually high competence and motivation.

First choice _____

Second choice _____

Third choice _____

_____

Your name

APPENDIX C

PAGE

APPENDIX C

Item Probabilities and Expected Frequency Distributions of Shift Scores for Four Sections of the PSI

Probability of true responses to items of each sub-test

Oscillatory Section		T Section		F Section		Control Section	
Items	p	Items	p	Items	p	Items	p
2	.887	50	.760	92	.242	65	.432
3	.355	51	.574	93	.345	23	.577
4	.527	52	.662	94	.597	112	.802
5	.360	53	.900	95	.345	113	.487
6	.692	54	.907	96	.047	7	.280
7	.280	55	.587	97	.200	74	.690
8	.913	56	.607	98	.045	39	.445

Expected frequency distributions of shifts generated from the above

# Shifts	Oscillatory Section	T Section	F Section	Control Section
0	.0110	.0840	.0453	.0114
1	.0282	.1550	.1366	.0763
2	.2665	.2978	.2475	.2162
3	.1099	.2556	.2939	.3310
4	.4537	.1680	.1893	.2683
5	.0430	.0338	.0781	.0852
6	.0877	.0058	.0093	.0115

Note: Item probabilities are based on Lanyon's sample of 400 females.

APPENDIX D

Analysis of Variance for Total Shift Scores and Perseveration Scores

APPENDIX D

Analysis of Variance for Total Shift Scores and for Perseveration Scores

Total Shifts

Groups	Mean Score
Highs (H)	65.21
Lows (L)	63.94
Schizophrenics (S)	64.55
Organics (O)	59.87

Source	SS	df	MS	F	p
Total	5281	162			
Between	494	3	164.67	4.5239	.005
Within	4787	159	36.40		

Comparison of means (Tukey's HSD method)

H vs. L
q = 1.2793

H vs. S
q = 0.6649

H vs. O
q = 5.3793 $p < .001$

L vs. S
q = 0.6145

L vs. O
q = 4.0999 $p < .001$

S vs. O
q = 4.7144 $p < .001$

Perseveration

Groups	Mean Score
Highs (H)	40.77
Lows (L)	41.65
Schizophrenics (S)	38.47
Organics (O)	50.00

Source	SS	df	MS	F	p
Total	25205	162			
Between	2091	3	697	4.7947	.005
Within	23114	159	145.37		

Comparison of Means (Tukey's HSD method)

H vs. L
q = 0.4436

H vs. S
1 = 1.1593

H vs. O
q = 4.6525 p < .001

L vs. S
q = 1.6029

L vs. O
q = 4.2089 p < .001

S vs. O
q = 5.8118 p < .001

APPENDIX E

Chi-square Computations with
Combining of Categories Necessary
to Achieve Minimal Expected Frequency

APPENDIX E

Chi-square Computations with Combining of Categories Necessary to Achieve Minimal Expected Frequency

High-performing Subjects
n = 52

Oscillatory Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	2.04	0.57 1.47	13.86	5.71	23.59	6.80	2.24 4.56
Ob. freq.	2.00	1.00 1.00	10.00	6.00	22.00	12.00	2.00 10.00

df = 4
x^2 = 5.1742

T Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	12.43	4.37 8.06	15.49	13.29	8.74	2.06	1.76 0.30
Ob. freq.	10.00	5.00 5.00	21.00	7.00	8.00	6.00	6.00 0.00

df = 4
x^2 = 13.0105
p .01

F Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	2.36	9.46 7.10	12.87	15.28	9.84	4.06	4.54 0.48
Ob. freq.	4.00	7.00 3.00	25.00	13.00	6.00	1.00	1.00 0.00

df = 4
x^2 = 16.6712
p .01

Control Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	0.59	4.56 3.97	11.24	17.21	13.95	4.43	5.03 0.60
Cb. freq.	0.00	6.00 6.00	8.00	13.00	18.00	2.00	7.00 5.00

df = 4
x^2 = 4.3660

Low-performing Subjects
$N = 51$

Oscillatory Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	0.56	2.00 1.44	13.59	5.60	23.14	2.19	6.66 4.47
Ob. freq.	0.00	3.00 3.00	12.00	11.00	18.00	1.00	7.00 6.00

$df = 4$
$x^2 = 7.0522$

F Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	4.28	12.18 7.90	15.19	13.04	8.57	1.72	2.02 0.30
Ob. freq.	6.00	14.00 8.00	17.00	7.00	10.00	2.00	3.00 1.00

$df = 4$
$x^2 = 3.0004$

F Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	2.31	9.28 6.97	12.62	14.99	9.65	4.45 3.98	0.47
Ob. freq.	4.00	7.00 3.00	21.00	11.00	10.00	2.00 0.00	2.00

df = 4
x^2 = 8.54.83

Control Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	0.5[illegible]	4.47 3.89	11.03	16.88	13.68	4.94 4.35	0.59
Ob. freq.	0.00	4.00 4.00	10.00	19.00	13.00	5.00 4.00	1.00

df = 4
x^2 = 0.44464

Schizophrenics
N = 36

Oscillatory Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	0.40	14.97 1.02 9.59		3.96	16.33	21.04 1.55	3.16
Ob. freq.	0.00	27.00 9.00 7.00		11.00	8.00	9.00 1.00	0.00

df = 1
x^2 = 16.557
p .001

Rotation

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	3.02	8.60 5.58	10.72	9.20	6.05	1.43 1.22	0.21
Ob. freq.	1.00	4.00 3.00	6.00	11.00	5.00	7.00 5.00	1.00

df = 4
x^2 = 27.215
p .001

F Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	1.63	6.55 4.92	8.91	10.58	6.82	3.15 2.81	0.34
Ob. freq.	1.00	2.00 1.00	13.00	11.00	10.00	0.00 0.00	0.00

df = 4
x^2 = 9.688
p .05

Control Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	0.41	10.94 2.75	7.78	11.92	9.66	13.15 3.07	0.42
Ob. freq.	0.00	8.00 3.00	5.00	17.00	6.00	11.00 5.00	0.00

df = 2
x^2 = 3.307

Organics
N = 24

Oscillatory Section

Shift Scores

	0	1	2	3	4	5	6
exp. freq.	0.26	9.98 0.68 6.40		2.64	10.89	14.02 1.03	2.10
ob. freq.	2.00	19.00 0.00 11.00		6.00	3.00	5.00 2.00	0.00

df = 1
x^2 = 13.955
p .001

section

Shift Scores

	0	1	2	3	4	5	6
exp. freq.	2.02	5.74 3.72	7.15	6.13	4.03	4.98 0.81	0.14
ob. freq.	1.00	9.00 8.00	10.00	2.00	2.00	3.00 1.00	0.00

df = 2
x^2 = 0.558

F Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	1.09	10.31 3.28	5.94	7.05	4.54	6.63 1.87	0.22
Ob. freq.	0.00	10.00 1.00	9.00	7.00	6.00	7.00 1.00	0.00

$df = 2$
$x^2 = 0.030$

Control Section

Shift Scores

	0	1	2	3	4	5	6
Exp. freq.	0.27	7.29 1.83	5.19	7.94	6.44	8.76 2.04	0.28
Ob. freq.	1.00	9.00 3.00	5.00	8.00	4.00	7.00 2.00	1.00

$df = 2$
$x^2 = 0.758$

APPENDIX F

Raw Scores for All Subjects

APPENDIX F

Raw Scores for All Subjects

	Total Shifts	Perseveration	Shift scores for subtests			
			Osc.	True	Falsc	Control
Highs	69	25	4	3	3	2
	54	54	6	2	2	3
	69	47	6	2	3	4
	57	60	0	2	2	2
	61	48	3	2	3	4
	64	43	3	3	2	3
	66	42	4	4	2	3
	73	31	4	2	2	2
	67	40	4	4	0	6
	64	50	1	2	0	3
	63	50	2	2	2	4
	60	58	6	2	2	4
	79	18	4	3	3	3
	64	49	5	2	3	4
	63	47	4	1	2	3
	57	53	6	4	2	1
	59	46	3	2	2	2
	55	62	4	1	1	3
	65	36	6	2	2	5
	63	41	4	1	3	6
	70	33	2	2	2	4
	62	36	2	5	1	3
	66	49	4	2	3	4
	60	49	3	2	2	2
	74	17	4	3	2	3
	65	32	4	4	2	6
	65	42	6	0	3	4
	59	58	4	2	2	2
	61	51	6	2	1	4
	63	40	2	4	4	4
	67	43	2	6	2	1
	55	58	2	1	4	4
	61	45	4	2	3	2
	77	33	4	5	3	4
	73	21	2	5	3	4
	[illegible]	30	2	4	2	3
	[illegible]	34	2	1	4	3
	[illegible]	32	4	[illegible]	3	5
	[illegible]	29	4	[illegible]	5	4
	[illegible]	40	4	[illegible]	[illegible]	[illegible]

	Total Shifts	Perseveration	Shift scores for subtests Osc.	True	False	Control
Highs cont'd.	70	33	6	2	2	1
	73	24	2	3	4	1
	67	37	5	4	0	4
	68	37	4	0	2	1
	67	42	4	0	4	3
	64	38	4	0	4	3
	65	44	4	0	2	2
	62	35	3	4	3	1
	61	53	3	5	0	4
	68	26	6	2	2	4
	70	38	6	2	2	4
	65	37	4	3	4	6
Lows	62	42	4	4	4	1
	64	49	6	5	0	2
	74	26	4	1	2	4
	64	43	4	2	2	2
	59	35	3	2	3	3
	58	49	3	3	2	3
	49	70	3	0	2	2
	67	45	1	6	3	4
	62	41	3	1	4	3
	59	62	6	3	2	3
	56	53	6	2	4	5
	75	28	3	4	2	4
	74	36	4	3	4	3
	67	40	4	3	3	3
	70	41	2	0	0	6
	69	34	2	2	6	3
	58	48	4	1	2	3
	53	62	4	4	4	5
	71	29	6	2	3	1
	60	56	6	1	2	3
	56	50	3	2	3	2
	57	52	1	5	2	3
	63	34	4	0	2	3
	61	32	4	1	2	5
	72	44	4	1	2	3
	66	37	4	2	3	5
	51	56	4	4	2	2
	67	27	3	3	2	3
	57	59	2	3	2	4
	68	21	4	4	3	4

	Total Shifts	Perseveration	Shift scores for subtests			
			Osc.	True	False	Control
Lows cont'd.	67	38	4	1	0	3
	66	40	3	0	3	4
	56	53	4	2	1	4
	54	72	4	2	2	3
	69	25	2	3	2	2
	65	38	4	2	3	4
	63	41	1	4	2	4
	63	51	2	2	1	2
	65	39	3	2	4	4
	59	50	4	4	1	4
	63	30	2	4	4	4
	71	30	3	4	6	3
	71	31	5	0	4	1
	60	44	2	2	2	4
	64	34	2	2	0	3
	73	13	2	1	4	1
	57	57	2	2	2	3
	75	20	3	2	2	2
	70	32	2	4	3	2
	61	47	2	0	3	2
	69	29	4	2	4	4
Lez.	55	46	4	2	4	3
	58	55	1	3	2	3
	59	46	1	3	4	4
	69	29	3	6	3	3
	67	38	1	3	4	3
	70	30	4	4	4	5
	63	46	4	3	2	1
	62	47	3	2	2	2
	77	9	3	4	4	2
	66	26	1	4	3	3
	80	17	2	4	4	5
	65	39	2	3	3	4
	66	30	1	5	3	5
	65	15	2	4	4	4
	61	42	3	3	3	3
	72	23	2	5	3	3
	72	37	5	1	3	2
	65	36	3	2	3	4
	70	23	3	4	4	3
	67	35	3	5	2	3
	64	35	4	3	2	3

	Total Shifts	Perseveration	Shift scores for subtests Osc.	True	False	Control
Sez. cont'd.	58	50	4	1	1	3
	57	60	4	2	2	2
	62	43	1	4	2	3
	57	58	3	5	2	1
	72	37	2	5	2	1
	63	50	1	3	4	3
	64	43	1	3	2	4
	56	50	3	5	3	3
	58	50	2	1	2	3
	60	47	2	0	4	5
	62	48	2	3	3	4
	61	43	3	2	3	3
	67	33	1	3	2	5
	74	21	4	4	2	2
	60	45	4	2	0	3
Cri.	64	43	3	1	3	1
	51	75	2	2	3	4
	45	72	0	2	3	5
	64	41	3	5	4	3
	56	55	2	1	3	1
	61	38	2	2	4	1
	46	69	2	1	2	2
	56	60	3	2	2	2
	70	32	3	2	2	3
	64	32	4	1	2	3
	72	36	2	2	2	3
	55	59	3	3	4	0
	65	46	3	2	2	3
	64	36	2	2	4	3
	49	73	2	1	3	2
	60	43	4	4	2	4
	52	53	4	4	4	4
	41	78	2	3	2	6
	59	61	2	2	4	4
	52	52	2	1	5	5
	58	30	2	1	3	3
	57	49	5	3	3	3
	62	40	0	1	2	5
	64	42	2	0	1	2

APPENDIX G

PAGE

APPENDIX G

Proportion of True Responses Given by Subjects in Each of the Four Groups and in Lanyon's Sample

		Highs	Lows	Scz.	Org.	Lanyon's sample
Csc. Section	2	.962	.961	.472	.625	.887
	3	.192	.118	.333	.625	.355
	4	.500	.510	.500	.583	.527
	5	.077	.274	.361	.375	.360
	6	.731	.608	.722	.708	.692
	7	.135	.333	.611	.708	.280
	8	.846	.726	.833	.875	.912
T Section	50	.923	.843	.444	.583	.760
	51	.558	.628	.611	.792	.574
	52	.577	.628	.667	.792	.662
	53	.846	.922	.778	.958	.900
	54	.942	.922	.667	.750	.907
	55	.538	.490	.361	.708	.587
	56	.654	.784	.778	.750	.607
F Section	92	.308	.235	.139	.292	.242
	93	.269	.333	.694	.458	.234
	94	.635	.510	.861	.792	.597
	95	.462	.431	.694	.708	.347
	96	.019	.059	.306	.125	.047
	97	.192	.255	.361	.125	.200
	98	.000	.000	.361	.167	.045
Control Section	65	.308	.451	.722	.667	.432
	23	.615	.765	.833	.625	.577
	112	.500	.431	.583	.750	.802
	113	.462	.490	.389	.625	.487
	7	.135	.333	.611	.708	.280
	74	.712	.647	.278	.458	.690
	39	.288	.451	.417	.583	.445